KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2008/2009

INSTITUTE OF OPEN LEARNING (IOL)

EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION AND BACHELOR OF SCIENCE

SMA 201: CALCULUS III

DATE: Wednesday 17th February 2010 **TIME:** 11.00a.m – 1.00p.m

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INSTRUCTIONS:

Answer question one and any other two questions

Question One- Compulsory (30 marks)

a) Evaluate $\lim_{x \to 4} \frac{x-2}{2x^2-7x+6}$ [3 marks]

b) i) Define continuity of a function $f(x)$ at a point a. [3 marks]

ii) Show that $f(x) = \frac{x-2}{x^2-4}$ is not continuous at $x = 2$ [3 marks]

c) Suppose f is continuous on $[a,b]$ and differentiable in (a, b) and $f'(x) = 0 \quad \forall \quad x \in (a,b)$. Prove that f has a constant value $c \in (a,b)$ i.e. $f(x) = c \quad \forall \quad x \in (a, b)$. [4 marks]

d) Verify the Rolle's Theorem for the function $f(x) = x^2 - 11x + 24$ in the interval $-3 \leq x \leq 8$ [4 marks]

(11)

Question Five (20 marks)

a) Find the minimum value of $x^2+y^2+z^2$ subject to the condition $x+2y+4z=42$

(5 marks)

b) Find the direction in which $f(x,y,z)=(x+y)^2+(y+z)^2+(z+x)^2$ increases most rapidly at (1, 1, 1) and find the rate of change at which f changes in this direction.

(5 marks)

c) Evaluate $\int_{\theta=\frac{\pi}{4}}^{\frac{\pi}{2}} \int_{1}^{2\operatorname{eps}\theta} r^2\cos\theta\, dr\, d\theta$ (5 marks)

d) Verify Green's Theorem in the plane for $\int_c y(2xy-1)dx+x(2xy+1)dy$ where c is the circle $x^2+y^2=36$.

(5 marks)

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